UNIVERSITY OF WASHINGTON

ARBORETUM BULLETIN

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PRESIDENT'S MESSAGE

It has been a long and constant struggle to get the University and the City in agreement on the Arboretum's future. Things come up in the news media and activities appear in the community, such as the petition and lawsuit, which are designed to cause confusion in the mind of the general public, to antagonize the University's efforts, and perhaps to cause irrevocable collapse of the negotiations.

WE ARE PART OF THE PUBLIC, TOO! I would like to ask each member of the Foundation to take it upon himself to become acquainted with the facts—if you have not already done so—and to respond as quickly, thoughtfully, and as dynamically as possible as the need arises. Such response can be through letters to the editors of both the *Times* and *P.I.*, or to neighborhood newspapers. It can be on radio talk shows, letters to the City Council and Mayor, or conversations with your friends and neighbors. Members of the Foundation who are also members of other horticultural groups would serve our needs well by talking with their membership and encouraging them to respond in a positive manner also.

One of the problems is that when these statements come out, which are incorrect and cause confusion, and there is no response, it may appear that the general public feels the statement is true, and the general public is indifferent.

So that we may be as well informed regarding the facts as possible, Jean Henderson, our public relations person, has prepared two items: (1) a historical summary of the events that have taken place regarding the need for a lease and the negotiations between the University and the City and other governmental agencies these last three years, and (2) a resume of the University's position in the lease arrangements. Careful reading will show that the public will not suffer in the lease arrangements. Entry will be at designated points—other than that, the public will notice no significant changes that would lessen the beauty of the Arboretum. These materials are available at the Foundation Office.

Finally, let me say that we must exercise considerable patience in this whole affair as the opposition is relying on our finally giving up entirely—running out of hope and patience. We are not! And we are counting on each of you to let the opposition know this. We do not want what might appear to be indifference or apathy on our part to jeopardize the future of Seattle's Arboretum.

THE ARBORETUM BULLETIN

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THE UNIVERSITY OF WASHINGTON
Arboretum bulletin

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TABLE OF CONTENTS

President's Message ..... John A. Putnam — Inside Front Cover

One Million Dollars for Trees ..... Sydney R. Riordan — 2

San Francisco's Street Tree Exhibit ..... Brian R. Fewer, John W. Andresen — 5

Supporting Organizations of Botanic Gardens and Arboreta ..... Rosalie Milburn — 7

Crab Apples for the Puget Sound Region ..... C. D. Schwartze — 10

Arboretum Classes 18

New Members 18

A "Busman's" Holiday in Europe ..... Brian O. Mulligan — 19

Arboretum Spotlight
Rehderodendron macrocarpum ..... J. A. Witt — 25

Unit Conversations ..... Phyllis Morgan — 26

Favorites —
Polystichum munitum ..... Elizabeth Martorano — 27

Book Reviews 29

COVER PHOTO:
M. baccata 'Jackii' (Jack crab).
Photo: C. D. Schwartze

Fraxinus oxycarpa 'Flame,' 35th Avenue NE; a new tree which has proved very successful.

One Million Dollars for Trees

*SYDNEY R. RIORDAN**

"One Million Dollars to Plant Trees." That is what the people of Seattle gave to the Engineering Department when they passed the Forward Thrust Bond Issue. Taking this as a mandate from the people to plant trees, the Engineering Department began a street tree planting program that has seen over 10,000 trees planted on the arterials of the City since 1968.

The normal environment of an arterial city street is not conducive to easy living for anything, but to trees it seems to be extra severe. Roots are confined by concrete, its source of water is restricted and occasionally what water it does receive has been polluted by salts, oil and gasoline. Its trunk is beset by car doors, cars, trucks, dogs and people; its tops by wires, signs, air pollutants, diseases and insects.

With the above in mind the landscape architects of the Engineering Department set out to determine what they wanted in a street tree.

1. It was determined that the trees selected had to be able to withstand the above conditions very much on their own, as funds for maintaining these trees after they were planted, would be at a premium.

*Mr. Riordan is a Landscape Architect with the Department of Engineering for the City of Seattle.

***Acer rubrum* 'Armstrong,' Ballard Avenue; a suitable tree for a very narrow space.**

***Carpinus betulus pyramidalis*, West Marginal Way; Pyramidal Hornbeam used in an area of heavy pollution.**

2. The trees planted would also have to be in scale with the street, which means that as arterials are normally a minimum of sixty feet wide, the trees would have to grow to a minimum height of forty-five feet.
3. Trees would have to be able to be pruned up fourteen feet from the ground without disfiguring their shape in order not to interfere with pedestrians and trucks.
4. If possible the trees should have an interesting habit of growth, leaf texture, flower or season of color.
5. The tree roots should be of a type which would cause minimal lifting of walks, curbs or pavement.
6. Finally, that every effort would be made to introduce new varieties of trees to the streetscape and the rest of the City.

Five years and over ten thousand trees later, with the Forward Thrust Program at 70% complete, we are able to list the trees that have been selected.

Acer platanoides 'Cavalier'	Yesler Way
A. psuedoplatanus pyramidalis	Roosevelt Way NE
A. rubrum 'Armstrong'	Ballard Avenue
A. rubrum 'Doric'	NE 50th Street
A. rubrum 'Shademaster'	East Cherry Street
Carpinus betulus pyramidalis	West Marginal Way
Fraxinus oxycarpa 'Flame'	Roosevelt Way NE
F. pennsylvanica 'Marshall Seedless'	Olson Place SW
F. quadrangula	35th Avenue SW
F. summit	Fairview Avenue North
Liquidambar styraciflua	4th Avenue
Liriodendron tulipifera	Meridian Avenue North
Pterocarya fraxinifolia	24th Avenue NW
Quercus borealis	Aurora Avenue North
Q. palustris 'Sovereign'	Delridge Way SW

Q. phellos	Rainier Avenue South
Q. shumardi	Rainier Avenue South
Sophora japonica 'Regent'	NE 143rd Street
Tilia cordata XP110	35th Avenue NE
T. cordata 'Greenspire'	North 35th Street
T. euchlora	35th Avenue SW
T. platyphyllos orebro	California Avenue SW
Zelkova serrata 'Village Green'	16th Avenue SW

Some of these trees are varieties that have been used before (*Liquidambar styraciflua, Quercus borealis, Acer rubrum* 'Armstrong') and were used again because of prior success. Most, however, are newer selections.

In order to obtain more information on the effect of planting trees in a street environment, wherever possible two trees of each variety have been given to the Arboretum to grow, under conditions more suitable for trees than city streets. It is hoped that at the end of the Forward Thrust Program we will be able to use these control trees planted at the Arboretum under more or less ideal conditions, to compare with the trees planted on the city streets. We appreciate the cooperation of the Arboretum in this project.

The Forward Thrust Bond Issue as the funding source for the Street Tree Program is nearing an end. The success of this program has been such that it is now being recommended by members of the City Council that a new Bond Issue for Three Million dollars be put before the citizens of Seattle.

Liquidambar styraciflua, 4th and Stewart Street; one of the best street trees.

Liriodendron tulipifero, Meridian Avenue N; relates the surrounding campus area and the street.

San Francisco's Street Tree Exhibit*

BRIAN R. FEWER and JOHN W. ANDRESEN

Abstract. Through a variety of public relations media, San Francisco's urbanites are encouraged to visit and utilize a permanent demonstration of 54 species of recommended trees growing within actual city street and parkway conditions. The trees, now averaging from four to five inches in diameter, provide property owners, designers, contractors, and planners with living examples of selected ornamental and shade trees. Such a large array of diverse plant materials offers a wide latitude of choice to aid in the selection of trees to suit individual and municipal arboricultural needs. The Funsten Avenue Street Tree Exhibit, which incorporates the 54 species, originated, was sponsored, and is maintained by a concerned group of civic minded individuals and groups. Their efforts plus those of several City agencies create community unity to make San Francisco beautiful and functional through the use of trees.

San Francisco's citizens are resolute when they declare, "Trees make good neighbors." . . . municipal concern and pride by a large majority of San Francisco's people is evidenced in their search for hardy, yet attractive street trees. Their public vigil to enhance the urban environment is manifested in the unique Funsten Avenue Street Tree Exhibit. . . .

Enthusiasm ran high in 1968 when an assembly of civic spirited organizations and San Francisco's Departments of Public Works, and Parks and Recreation embarked on a tree demonstration program that continues to improve with maturity. In response to public need and the opportunity for some practical experience, Horticulture Center students of the City College of San Francisco installed the first phase of the tree exhibit as part of a 1968 summer-job program. Twenty-seven species, in replicates of threes, were soon planted as the start of a "Get to know trees" program. Expansion of the exhibit was furthered by another class of Horticulture Center students in 1970 with the addition of twenty-seven more species also assembled in groups of threes. . . . the Sears Roebuck Foundation provided $2,000.00 grants for materials, supplies, and labor support.

"San Francisco Beautiful," a volunteer citizens' organization . . . served as coordinator for the tree planting activities and also as bursar in disbursement of funds and grants associated with the project.

In the role of advisor and supervisor, the Tree Planting Division of the San Francisco Department of Public Works provided municipal effort and time to reinforce the momentum of the program. Layout, materials requisitioning and on-the-job instruction were given freely by the Division.

Geographically, the Funsten Avenue Street Tree Exhibit is located in the northwest section of the City, framed by two large masses of forest and glen. It is bordered on the south by Golden Gate Park and on the north by the Presidio. Two street-side situations are demonstrated. One array of trees is planted in close proximity to the street curbing along Funsten Avenue. . . . a second grouping of trees is blended into an existing parkway planting of Park Presidio Boulevard that features contrasting ages, shapes, and sizes of more conventional and mature trees. Thus, the visitor can visualize his favorite trees as they would be placed in the perspective of his own street-side or property planting.

The total assembly of labeled trees represents an interesting mélange of exotics and natives that have proven hardy in the Bay

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*This article which appeared in THE ARBORIST'S NEWS, Vol. 38, No. 11, November, 1973, is presented here in an edited version with the permission of the International Shade Tree Conference. Mr. Fewer is Supervisor, Street Planting Division, San Francisco Department of Public Works. Mr. Andresen is Professor of Urban Forestry, Department of Forestry, Southern Illinois University.

Area. Mediterranean and Australasian trees predominate in the Exhibit. Botanically, they serve as ornamental reciprocals for the many Californian forest and horticultural plants that now thrive in other parts of the world. Broad-leaved evergreens dominate the Exhibit with 44 species; the remaining 10 are deciduous angiosperms. . . .

In most instances, those people or firms who visit the Exhibit are prompted to learn more about the specimen trees in relation to establishing them on their own properties. Since most of the street tree planting that result from the visits to the Exhibit are established in City dedicated property, the Street Planting Division has developed a program of free assistance to serve the arboricultural needs and interests of San Francisco.

Three major forms of advice and assistance include:

1. Tree-planting applications, granting permission to plant sidewalk trees on City owned land, give simple, straight forward planting regulations and stress adequate liability insurance and proper location of utility lines and pipes before digging.
2. A trained arborist, dispatched by the Street Planting Division of the San Francisco Department of Public Works will suggest proper species selection and planting locations to customize a landscaping design and will recommend planting and maintenance techniques.
3. Since the Street Planting division does not engage in actual planting or sale of materials, the Division will supply a list of qualified arborists or contractors to those requesting assistance.

Once the trees are established, property owners or their tenants are encouraged to maintain their own street trees. Simple maintenance recommendations promote greater individual attention in irrigation and weeding, create a sense or arboreal possession, and allow the Street Planting Division to devote their resources to more pressing problems or emergency situations. . . .

Six cardinal recommendations to provide for healthy trees under San Francisco [or anywhere] conditions are:

1. Water newly planted trees frequently. Overhead watering is beneficial. As trees mature, water deeply and less often.
2. Fertilize lightly with balanced fertilizer in spring and fall. Do not overfertilize.
3. Spray trees when needed. Consult a local nurseryman or arborist for recommendations and service.
4. Prune and train trees annually to develop desired form.
5. Adjust support posts and straps as needed. Be sure that straps do not find the tree.
6. Clear branches to a height of 8 feet as tree matures and overhangs street or sidewalk.

In conclusion, the Funsten Avenue Street Tree Exhibit provides an incentive as well as demonstrative guidance to individual home owners, contractors and planners to plant the right tree in the proper site. In an advisory, service capacity the Street Planting Division provides technical counsel and ordinal control. The net result of combined private and public efforts is one of coherence and unification to develop a city arboricultural program that will be manageable and provide attractive streets for many years. ♠

Supporting Organizations of Botanic Gardens and Arboreta*

ROSALIE MILBURN

I feel that the definition of the title of my talk, "supporting organizations" is extremely broad. In my interpretation, it includes every effort for support—be it from one individual or from groups of a few people, of hundreds or of thousands. It is extremely important to recognize that a botanic garden or arboretum has many different appeals to the public. There are those individuals who want to participate actively, those who want to learn, those who just want the pleasure of enjoyment, and those who want to share and give. Each type of involvement should be appreciated for its own worth, and any arboretum should have its program framed to encompass all aspects of these types of participation. It is basic to the concept of a botanic garden or arboretum that it survives to be of service, and that automatically means serving the public and the community.

Because I feel that my long association with both the Arboretum Foundation and the Seattle Garden Club has given me the opportunity to witness and participate in two different and extremely successful methods of support, I am going to give you an idea of their contributions to Seattle's University of Washington Arboretum over the 40 year period of its existence. In each case this encompasses the life span of the Arboretum in its present location in Washington Park. In 1936, when it was in its formative stage and little more than a dream, the Seattle Garden Club undertook to have a basic ground plan drawn for the placement of various plant families by the Olmstead Brothers firm of Landscape Design of Brookline, Massachusetts. Over the years that plan has been followed except for a few changes due either to soil conditions or particular needs of specific plants. At the time the basic ground plan was made, the Seattle Garden Club accepted the responsibility of the development of Azalea Way which is a major feature of the Arboretum. The club had a detailed plan done for that particular area by the same firm, and that plan also was given to the Arboretum. This three-quarter mile grass walk which is bordered with Japanese cherries, eastern dogwoods, and many kinds of azaleas is a permanent project of the club. I am guessing that there will be at least another ten years of work to see this area fully developed. And there never will be a time in the future when new varieties won't be added and replacements be made. From the earliest days, this club has maintained an active interest and participation—giving plants, special fertilizers, weed control chemicals and paying for plantings. In recent years it has assisted in maintenance during the peak growing months. This club has a broad and diversified program, but the Arboretum will always be an important part of it. It has been a very happy relationship and one that I think would be well worth looking into for other arboreta or botanic gardens. A single club can assume responsibilities for a designated unit within the framework of a whole area very satisfactorily. And it can be a very rewarding experience for both.

Funds for the support of Azalea Way have been raised by a variety of projects, but all of them have been related to horticultural endeavor, flower arrangement displays, plant sales, plant auctions. This is the accomplishment of a club of fewer than two hundred members. Over the years the director of the

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*This paper is one which Mrs. Moritz Milburn, member of the Executive Committee of the Arboretum Foundation, delivered at the Western Regional Meeting of the American Association of Botanic Gardens and Arboreta in San Francisco, California, February 22, 1974.

Arboretum has worked closely with their committees advising them of the greatest needs for the area and possibilities for future development.

Other garden clubs certainly could be mentioned, because their contributions have been substantial and extremely effective. I do want to mention two whose contributions in financial backing for plantings and plant collections and membership participation in weeding and maintenance have been outstanding over many years—the West Seattle Garden Club's involvement with the Woodland Garden and the Mercer Island Garden Club's long association with the Winter Garden. More recently the Northwest Ornamental Horticultural Society has made large general contributions of support; a large part of their program has been geared to educational programs open to public participation. Not being a member of any of these last mentioned organizations, I do not feel qualified in properly reporting for them.

Without any question, the largest supporting group for the University of Washington Arboretum is the Arboretum Foundation which was founded in 1935 with the express purpose of promoting, fostering and assisting in the establishment, development, growth and maintenance of the Arboretum. A small nucleus of dedicated citizens started the Foundation feeling that the University would need help in seeing such a development become an accomplishment. Presently the membership is nearing the 3,000 mark. It is a wonderfully active, strong organization that has had excellent leadership and fine community and state representation on its board. The thirty-six members of the Governing Board plus members of the Honorary but non-voting Board meet four times a year, but the general business of the Foundation is carried on by the Executive Committee which meets alternate months and is made up of officers and committee chairmen. The director of the Arboretum attends all regular Board meetings and generally one or more members of the College of Forest Resources faculty or staff report on current events, projects or problems in Arboretum affairs. Sadly, we have been faced in the past few years with more problems than could ever have been anticipated; but in some ways I think the problems have even strengthened the Foundation. WE DO NOT WANT TO LOSE THE ARBORETUM!

This group has a Memorial Fund which has been a valuable source of income over the years. Ideally, distribution of these funds should be determined by needs for the area and should be in keeping with the University's intent for future development. For many years the Memorial Fund Committee planned specific plantings or individuals gave benches or drinking fountains, etc. But it has become clear that the University of Washington's controlling committee wants to have the final word in acceptance of such gifts and we need to broaden our memorial participation to conform to University policy and procedure in the future.

The Foundation is responsible for the quarterly editing of the *UNIVERSITY OF WASHINGTON ARBORETUM BULLETIN* which goes to all members and has a wide distribution throughout the world in exchange for other similar publications. The editorial committee is made up of Foundation members and faculty and staff of the University of Washington, and the publication certainly speaks for itself in quality. It is designed to be informative and educational with broad appeal for its horticulturally-minded readers. Recently, color has been added and the type set has been changed and we are proud of its up-to-date character. Thinking toward the future, it is possible that we might want to sell yearly subscriptions to this popular, informative quarterly for circulation throughout our state and the Northwest area.

This past year the Foundation has been responsible for the publication of a book titled *THE LONG ROAD TRAVELLED* written by Dr. Henry Schmitz, an early professor in the College of Forestry and a past President of the University. Dr. Schmitz's untimely death left a manuscript that needed corrections and refinement, and the dedicated efforts of a few of our members made the book a reality. It is a fascinating history of what is now the University of Washington's College of Forest Resources and contains a chapter on the Arboretum giving in detail the only recorded

account of the University's efforts in developing an Arboretum at its present location from its first days of existence to the time of his death.

Recently we subsidized the publication of Dr. Hitchcock's *"FLORA OF THE PACIFIC NORTHWEST."* Many of you surely are familiar with this fine work. Over the years we have been responsible for the distribution of many educational pamphlets, booklets and brochures. This type of publication is a project we will surely want to pursue in the future.

In June of 1972, the Foundation underwrote, planned and presented a symposium on "The Urban Arboretum in a Time of Crisis." Representatives from related groups; city, county, state, national and university officials; directors of Arboreta and concerned individuals were invited to attend and participate. This three day session was held on campus but gave all registrants an opportunity to be on the Arboretum grounds the final half day. Dr. Odegaard, President of the University, gave the welcoming address and said in his opening remarks, "I think that the action of the Arboretum Foundation in sponsoring this particular symposium at this time is a very important one, certainly for us in Seattle. I suspect that the problems that we are encountering with reference to the Arboretum here are increasingly evident in many other parts of the country as urbanization continues apace with green space shrinking and population increasing. I suppose we have a classic group of the kinds of problems that arise. I would like to express appreciation to those who have come to Seattle from afar to offer their experience and their counsel at this particular time." He was referring to our distinguished and knowledgeable speakers from Canada, Los Angeles and Chicago. This was a most meaningful and well-timed contribution in public relations and understanding of difficult problems.

The unique feature of the Arboretum Foundation is the Foundation Unit Council which involves half the total membership. This group of fifteen hundred in their eighty individual units form the hard core working and learning group of the organization. These are dedicated members of the Foundation who want to participate to the greatest extent as well as add to their horticultural knowledge. An integral part of the parent organization, no one may be a member of an Arboretum unit who is not a member of the Foundation. The Council, also, meets four times a year with two representatives from each unit attending. The groups average a membership of twenty and meet eight or nine times a year, usually in private homes. One unit's efforts are exclusively channeled to participation with the Japanese Garden. One packages and catalogues seeds for world-wide distribution working under the direction of the Arboretum staff in the greenhouses. And one mounts and numbers slides for the permanent Arboretum collection. But, generally, the individual units form their own programs according to their own needs, usually incorporating a field trip and a fund raising project for the Arboretum.

Let me tell you briefly about a few of the unit council activities and I think you will be impressed with the scope and success of their endeavors. One of their newest ventures and one that has had great impact is in the environmental educational field. Five years ago a few members went into the schools to acquaint elementary students with native plant material. Today, as requests for this program come from six school districts, it is obvious that the twelve "Arboretum Ladies"—so named by happy children—are a smashing success. As we look to the future, there is a need to train more volunteers for this project. The demonstrations are made informally with as much plant material as can be carried into the classroom—cones, berries, large branches, ferns, seedlings, and pieces of rotting logs—to give a picture of the woodland environment. The students come to the Arboretum or go on a field trip to one of our county forest camps with new awareness and happy ability to be able to identify more of their world.

Members of the Unit Council who work in their greenhouse on the Arboretum grounds are reponsible for the propagation and distribution of unusual plant material not only to our membership but to the community at

(continued on p. 28)

Fig. 1. *Malus zumi*, gracefully arching white-flowered tree of moderate size. Photo: C. D. Schwartze

Crab Apples for the Puget Sound Region

*C. D. SCHWARTZE**

Crab apple blossoms, white, pink, red and reddish-purple, enhance the charm of springtime in the Puget Sound region. Elsewhere across North America at least 300 species and varieties, chiefly of oriental origin or ancestry, are to be found in arboretums, botanic gardens and parks. Many very hardy varieties derived from Siberian species are enjoyed in the central and northern parts of the continent where winter cold precludes the less hardy but colorful cherries, peaches and plums. Two crab apple varieties, 'Arctic Dawn' and 'Snow Cap,' survive without injury at Beaver Lodge, Alberta, inside the arctic circle, where winter temperatures range to −60°F.!

Here in the Puget Sound basin winter hardiness is not a factor in deciding what crab apples to propagate in nurseries or to plant for whatever purpose—in planters to be moved onto patios in blossom season, in gardens, parks, landscape plantings, along highways. Any and all of the species and varieties of the world could be grown here. The problem is to select the very best.

In the 1955 (second) edition of the valuable publication, *CRAB APPLES FOR AMERICA*, Donald Wyman of the Arnold Arboretum stated that at least 125 species and varieties were available from commercial sources in the United States. In the foreword to Arie F. den Boer's book, *ORNAMENTAL CRAB APPLES* (1959), Wyman wrote, "new varieties are being introduced annually and no listing of 'current' varieties is ever up-to-date."

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*Dr. Chester Druse Schwartze, horticulturist (retired) of Western Washington Research and Extension Center, Puyallup, a branch of Washington State University, Pullman; since 1948, as an avocation, has grown and studied over 150 species and varieties of crab apples, originated four varieties, experimented with propagation of crab apples as dwarf trees and with growing crab apple trees in tubs.

Dr. Wyman could as well have been writing in 1974. Outstanding new crab apples have been introduced recently. Also, older varieties esteemed elsewhere for more than 20 years, such as the lovely 'Henry F. Dupont,' 'Liset,' 'Professor Sprenger,' 'Tanner' and 'Van Eseltine,' have proved upon adequate evaluation to be superior to many varieties previously recommended for the Puget Sound region.

Research, both publicly and privately supported, is affecting the choice and the evaluation of varieties: (1) disease-resistant crab apples have been discovered; (2) many varieties can be propagated as dwarf and semidwarf trees that can be grown in spaces that are too small for full-size trees; (3) dwarf and semidwarf trees, especially, can be grown in containers such as wooden or plastic tubs. Trees in containers are useful for display and for out-of-season planting.

DISEASE RESISTANT CRAB APPLES

Here around Puget Sound the most serious and widespread disease of crab apples is apple scab, caused by the fungus *Venturia inaequalis*. Most of the crab apple varieties presently grown here require spraying with fungicides to prevent the typical, unsightly sooty black blotches from appearing on the leaves and fruit. When severe, the disease causes premature dropping of leaves, partially denuding the trees.

Among the varieties most severely attacked by scab are the widely planted 'Almey,' 'Bechtel,' 'Eleyi,' 'Hopa,' 'Radiant' and 'Scheideckeri.' Prevention of damage is difficult with such susceptible varieties, even when recommended spray schedules are followed. Varieties that are highly resistant to the fungus require much less, if any, spraying.

Dr. Lester P. Nichols (1973) of Pennsylvania State University, in a twelve-year survey in six states where scab is prevalent, rated forty-one species and varieties as highly resistant. Hansen and Hasselkus (1974) in an especially bad scab year in Wisconsin, rated twenty-four as highly resistant. Unfortunately, many of the most resistant varieties are not the most desirable from the ornamental standpoint. Resistant ones do include some very good ones such as the Jack Crab, 'Liset,' 'Mary Potter,' 'Profusion,' Tea Crab (*Malus hupehensis*), and Zumi (*M. zumi*). The ever-popular Japanese Crab (*M. floribunda*) and the choice 'Van Eseltine' have been rated moderately resistant.

No systematic study has been made of scab resistance in the Puget Sound region. I have personally observed, in growing more than 150 varieties and species, only twenty of those rated as highly resistant in the surveys cited. Those twenty have shown little or no scab here in my experience.

Many fine varieties introduced recently have not been rated with reference to scab resistance. Research on this important problem is sorely needed. Scab resistant varieties, so far as they are known, will be indicated later in this article with variety descriptions.

DWARF AND SEMIDWARF CRAB APPLE TREES

"Dwarf" and "semidwarf" as applied to fruit trees, especially apples, have become household words. Orchardists, but not necessarily all gardeners, understand that "dwarfing" as used in this context is the result of grafting a variety ('Delicious,' e.g.) onto a special root (rootstock). It is the rootstock that controls and determines the ultimate size of the tree.

Special rootstocks originated at experiment stations at East Malling and Merton, England are now used by nurserymen throughout the world to produce apple trees in a series of sizes ranging from one-quarter to one-third size (dwarf) to one-half size (semidwarf) and larger, in comparison with the same variety grown on a non-dwarfing rootstock (usually apple seedlings). Rootstocks in general use for apples are designated M (for Malling) and MM (Merton-Malling) plus numbers, e.g. M26, MM106.

First attempts by the writer and others to graft crab apples onto dwarfing rootstocks, some thirty years ago, resulted generally in failure; a few dwarfed trees were produced, such as the one of *M. sargenti rosea* shown in Fig. 2. It is now known that the rootstocks used at that time (M9, M7) were a likely cause of failure because they carried viruses that are

Fig. 2. *M. sargentii rosea*, fifteen years old, on M7 root. About two feet high and three feet wide. Photo: C. D. Schwartze

destructive to many varieties of crab apple. Later, when the virus-free rootstocks M26 (dwarfing), MM106 (semidwarfing) and MM111 (slightly dwarfing) became available, the writer undertook quite extensive experiments in grafting crab apple varieties onto these stocks. The experiments were conducted in cooperation with Mr. Francis A. Chervenka, a wholesale grower of apple rootstocks near Sumner, Washington.

To be brief, we can say that results have been good with some crab apple varieties, fair with some and poor with others. Crab apples of the "dual purpose" type, good for jelly making and fairly good as ornamentals, generally have done well on dwarfing rootstocks. Ornamental varieties that have been propagated successfully in dwarf and semidwarf sizes include 'Carol Ann,' 'Cathy,' 'Henry F. Dupont,' 'Hopa,' 'Jack,' 'John Edward,' 'Golden Hornet,' 'Liset,' 'Makamik,' 'Professor Sprenger,' 'Renée,' 'Royalty,' 'Sparkler,' 'Tanner,' 'Van Eseltine' and Zumi. 'Arnold,' 'Carmine' and 'Midget' have been successful on MM106.

Several desirable varieties have failed to "take" on dwarfing roots: 'Dorothea,' Japanese Crab, 'Katherine,' 'Lemoinei,' Scheidecker.

CRAB APPLE TREES IN CONTAINERS

Container-grown trees offer distinct advantages to both nurseryman and buyer. The top-rated Jack Crab, to cite an example, starts growing in February in our mild winters and so cannot be dug and transplanted later, in the normal planting season. Container trees can be moved and planted out even after growth has begun.

A handicap in the introduction of new varieties is the difficulty of bringing them to the attention of gardeners and landscapers. Trees growing in tubs can be displayed in garden centers while in bloom, enabling interested persons to become acquainted with varieties, both new and old. A display of crab apples in bloom is distinctly educational, as my wife and I can attest to after opening our modest collection to the public during blossom seasons.

Methods and soil substitutes for growing

trees in tubs are available elsewhere, so will not be discussed here.

All crab apples can be grown in tubs, but those that form flower buds in the first or second summer after planting in tubs are especially suited to container culture. Some especially precocious ones are 'Carol Ann,' 'Cathy,' 'Jack,' 'Katherine,' 'Professor Sprenger' and 'Van Eseltine.'

SELECTING A VARIETY

People sometimes ask me to name the one best crab apple, or the best two or three. This is, of course, impossible or at best, impractical. Should one choose one that blossoms extra early? At midseason? Late? Red, pink or white blossomed? Narrow, upright tree, gracefully arching, broad-spreading? Foliage green, purple-tinted, all-purple? Thirty-foot tree or six-foot?

Of course I have favorites: the early 'Renée' displaying its crimson buds; 'Van Eseltine' with half its big mahogany-red buds opened into rose-and-white double blossoms on long slender stems, rivaling the oriental cherries; 'Royalty' in its glossy red-purple new foliage, or in marvelous autumn colors; and so on —.

The crab apple to buy is the one that strikes the buyer's fancy for a particular spot or purpose, keeping in mind whether spraying for scab control will be necessary. One visitor to our orchard-garden may enthuse over the little Pinkbud Sargent dwarfed by its rootstock (Fig. 2.) A landscaper may select the white-flowered Sargent Crab to accent a highway planting and to hold down maintenance costs by its resistance to scab. Someone else will visualize the broadly drooping 'Mary Potter' or the stiffly upright 'White Candle' in some favored spot. For very good reasons, nurseries that specialize in crab apples commonly offer thirty to forty varieties.

Only scab-resistant varieties should be considered if the trees will not be sprayed. I would drop from further consideration those such as 'Almey,' 'Bechtel' and 'Eleyi,' that cannot be protected from the scab fungus except by heroic measures. With many varieties that are not highly resistant, scab can be controlled readily enough with modern fungicides so that one need not forego growing the red-budded 'Arnold,' the creamy-blossomed 'Tanner' or the lovely 'Pink Perfection,' or many others.

CHOICE VARIETIES FOR GARDEN OR LANDSCAPE

In the following descriptions the symbol (R) denotes a high degree of resistance to scab, (MR) means moderate resistance. Absence of either symbol indicates a need for scab control. In the case of a new variety, the need for spraying is assumed if not known.

Several varieties with white or very light pink blossoms are included because I have long felt that light colors should be used freely to add brightness and accent to the naturally somber Puget Sound landscape.

All of the varieties listed have been floriferous at Puyallup. All have bloomed annually.

Well-known varieties are described only briefly; more details may be found in Wyman's (1955) or den Boer's (1959) books. Those interested in history and crab apple pedigrees will find Jefferson's (1970) publication of interest.

Varieties Blooming Extra Early

Only the Manchurian Crab blooms ahead of the following three which blossom together in April, making a lovely show:

'Dolgo': (R) White. A more graceful white-blossomed variety blooming at the same time would be welcome. Some one should "make" one.

'Midget' (*Malus micromalus*): Old outstanding pink; good as dwarf, semidwarf; good in tubs. Small yellow fruit.

'Renée:' A new color in this season; masses of crimson buds opening light red to deep pink; foliage reddish bronze becoming dark green in summer; fruit small, purple, not very ornamental; tree irregular, rounded, to eighteen ft. Grafts readily onto dwarfing rootstocks; good in tubs.

Blooming in Early Midseason

'Carol Ann': Introduced in 1972. Very floriferous. Beautiful pink buds, large single pink-and-white blossoms cover every twig; green

Fig. 3. *Malus* hybrid S-6-39: new double white crab apple with three-inch flowers raised by R. C. Simpson, Vincennes, Indiana. Photo: C. D. Schwartze

foliage. Tree spreading, 12×18 ft. Good as semidwarf. Excellent in tubs.

Jack Crab (*M. baccata* 'Jackii'): (R) Large milk-white buds and blossoms against expanded light green leaves; fruits small, glossy dark red, ornamental. Tree naturally large; grafts readily onto dwarfing rootstocks. Excellent landscape tree, free of pests. Good in tubs.

'Mary Potter': (R) Naturally broad habit, easily pruned to drooping, semiweeping; slender branches lined with pink-and-white blossoms, followed by small, round, bright red fruits. Green foliage. Fine specimen tree.

'Profusion': (R) Most scab-resistant of red-flowered crabs. Leaves purple-tinted. Not fully evaluated.

'Royalty': New, unique, purple-leafed tree, holding purple color all summer; gorgeous fall colors. Blossoms purplish-red, single, open after leaves emerge. Fruits small, purple, not showy. Tree upright, about twelve ft. Grafts easily onto dwarfing rootstocks. Good in tubs.

'Tanner': Profuse, very large single creamy-white blossoms; light green foliage, greenish bark; tree of moderate size, broadly upright. Beautiful anywhere. Grafts well onto dwarfing roots. Very good in tubs.

Midseason Bloom

Arnold Crab: Long known. Notable for fuchsia-like bright red buds, large pink-and-white semidouble blossoms; arching, drooping branchlets; green leaves; spreading habit.

'Cathy': (R) Introduced in 1973. Tree broad like Japanese Crab with lighter colored buds and blossoms. Profusely covered with bright pink buds; light pink blossoms change to near-white with conspicuous yellow stamens; leaves green; numerous small yellow fruits and reddish-bronze leaves attractive in autumn. Not easy to graft onto dwarfing rootstock.

'Dorothea': Notable for brightness of deep pink semidouble flowers and attractive small yellow fruits. Tree at least as broad as tall, moderate size; green leaves. Precocious but difficult to graft onto dwarfing rootstocks.

'Henry F. Dupont': Splendid ornamental tree of moderate size, upright-spreading habit; glossy red-purple leaves in spring and again in autumn; blossoms single, reddish-purple changing to pink and finally almost lavender, attractive. Fruits small, attractive bright red, persistent. Grafts readily onto dwarfing rootstocks.

'Gorgeous': (R) Ordinary pink-white flower but

Fig. 4. Tanner tree with cream-white blossoms. A beauty. Completely compatible; will make fine tub plants if grafted onto M26. Photo: C. D. Schwartze

outstanding in beauty of dark crimson, abundant fruit about one inch in diameter, slightly conic, with persistent green calyx. Tree small; leaves green.

Japanese Flowering Crab (*M. floribunda*): (MR) Brought from Japan to U.S. in 1862. Still popular.

'John Edward': (At least MR) Introduced 1973. Best feature is autumn color—masses of yellow-orange small fruits, with yellow foliage; blossom pink-and-white; leaves gray-green, crumpled; tree upright-spreading to fourteen ft. Grafts readily to dwarfing rootstocks.

'Katherine': Choice though fairly well known. Dainty, soft pink double blossoms with narrow petals; dark green leaves. Tree upright at first, becoming broad-topped with age. Has not grafted well onto M and MM series rootstocks. Excellent in tubs.

'Liset': (R) Our tree differs from den Boer's (1959) description as to color of flower and fruit as it has brightly colored blossoms near the color of tangerines and reddish-purple small fruits that add to its attractiveness. Tree is vigorous, with large leaves that are purplish in spring, dark green in summer. The medium-sized star-shaped blossoms line the older branches. A somewhat bulky tree, suited to large parks, etc. Notably free of pests.

'Pink Perfection' (Pl. Pat. 2912): A mass of beautiful pink single blossoms on a broadly upright, green-leafed tree. Too new for complete evaluation but quite outstanding. Requires spraying for scab control.

'Professor Sprenger': (R) Large, single, light pink blossoms become almost white; foliage green; tree upright spreading with slender branches. A useful, trouble-free tree. Fruit small, not very ornamental. Grafts readily onto dwarfing rootstocks.

'Van Eseltine': An outstanding ornamental crab apple. Large bright mahogany-red buds, very large rose-and-white double blossoms pendent on long stems. Dark green crinkled leaves but purplish at branch tips. Fruit sparse, small, pear-shaped, yellow or with red cheek. Tree upright to pyramidal while young, more spreading with age. Grafts readily onto dwarfing rootstocks. Precocious. Excellent tub plant.

'White Candle': New, unique; stiffly upright to fastigiate. Buds red, blossoms light pink to near-white, to 2-and-1/2 inches D., double.

Zumi (*M. zumi*): (R) Gracefully arching white-flowered tree of moderate size, excellent for landscaping larger areas. Can be dwarfed.

Late-flowering Varieties

Sargent Crab (*M. sargentii*): (R) A 6 to 7 ft. shrubby tree with green leaves and white blossoms, not exceptional in beauty; fruit very small, red, not very ornamental. Useful in highway landscaping, parks, etc. where scab resistance is desired. Comes true or nearly so from seeds.

Pink Bud Sargent (*M. sargentii rosea*): (R) A small tree, more attractive than Sargent Crab; pink buds, pink-and-white blossoms. Takes rather well on M26 dwarfing rootstock. Interesting small tub plant.

'Silver Moon': (R) One of the last to bloom, in late May. Rather stiff upright small tree. Blossoms pure white, often in groups, pretty against the green foliage.

Dual-purpose Crab Apples

'Dolgo': (R) Dark red, egg-shaped, medium sized fruit in August; makes rich-flavored light red jelly. Blossoms white. Not exceptionally ornamental but valued as companion to other early-blooming varieties.

'Martha Dolgo': (MR) An overlooked superior crab. Blooms a few days after 'Dolgo', has larger, more attractive blossoms which are milk-white; fruits twice the size of Dolgo's, attractive scarlet, crisp and edible, though sour; good for jelly.

'Redflesh': Attractive crimson fruit resembling 'Red Delicious' apples in appearance, approximatedy two inches long, ripe in October, make good red jelly; leaves purple-tinted; blossoms purplish-red.

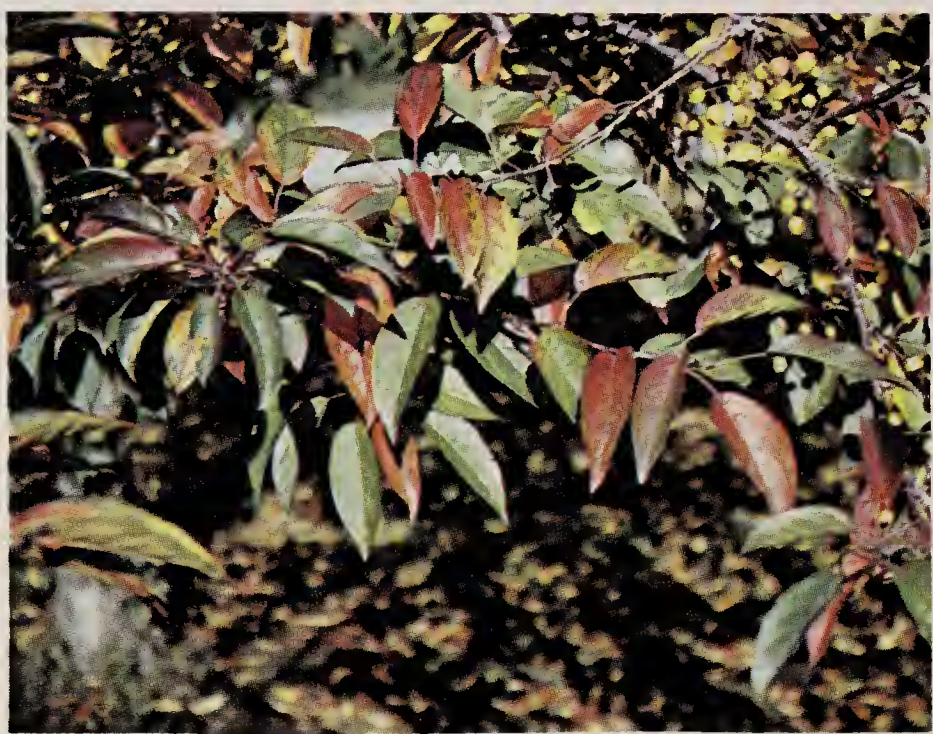
Additional Variety Notes

The Parkman Crab is very beautiful, with bell-like pink flowers; it is slow growing and I have found it difficult to propagate.

(continued on p. 29)

Fruits of *M.* 'Martha Dolgo' are crisp and edible, though sour, and make good jelly.

M. 'John Edward,' introduced in 1973, has masses of yellow-orange small fruits and lovely autumn colored foliage.



Reddish-bronze leaves and small yellow fruits make *M.* 'Cathy,' introduced in 1973, attractive in the fall.

M. 'Gorgeous' — dark crimson, abundant fruits one inch in diameter live up to the name!

M. 'Cathy,' broad spreading like *M. floribunda*, is light pink becoming pure white.

Crab Apples for Puget Sound Gardens

Photos: C. D. Schwartze

M. 'Van Eseltine,' an outstanding ornamental crab apple, is a real beauty that should be widely planted.

M. 'Lemoine,' in the University of Washington Arboretum, is a favorite red crab apple.

M. 'Renee' buds are crimson, opening blossoms a deep pink.

M. 'Renee,' introduced by us in 1973, brings a new color in the extra early class.

Arboretum Classes

The College of Forest Resources coordinates the educational activities of the Arboretum. To register for classes, registration blanks are provided in SPECTRUM. If you wish your name to be placed on the list to receive SPECTRUM, phone 543-2590 or write University of Washington (DW-20), 400 Lewis Hall, Seattle, Wa. 98195.

The next series of University arranged classes will begin Fall Quarter, 1974. The Summer issue of the BULLETIN appearing the latter part of August will list classes that have been arranged for that period.

For those members who wish to pursue horticultural activities during the summer months the following classes beginning June 24, 1974, are scheduled at the Edmonds Community College. To receive their Horticultural Bulletin or additional information, please call 775-3511, ext. 257 or 335.

PLANT DISEASES (4 cr.) The life cycles and damages of common viruses, bacteria, fungi and nematodes are dealt with as are the various cultural and chemical controls. (Mondays and Wednesdays: 6:30 - 10:20 PM; seven weeks only)

SOILS AND PLANT NUTRITION (6 cr.) Physical and chemical properties of soils, organic and inorganic amendments are analyzed in relation to plants' needs. (Mondays and Wednesdays: 6:30 - 10:20 PM)

TURF ESTABLISHMENT (5 cr.) Seedling and sodding of lawns and grounds; the elements of design, drainage, irrigation and management are considered. (Tuesdays and Thursdays: 6:30 - 10:20 PM)

This is your Arboretum, kept alive by your support

We are pleased to welcome the following new members (January 1, 1974 through February 28, 1974):

Contributing — Mr. & Mrs. Dean R. Haggard. *Sustaining* — Mrs. Benjamin K. Rogers. *Annual* — Mrs. Alan D. Adams, Mrs. Willard R. Barker, Mrs. Robert E. Beach, Mrs. Beth B. Brolin, Mrs. Richard J. Carr, Marianne Cassar, Mrs. Robert A. Dahlstrom, Mrs. Robert Hendricks, Mrs. William S. Hickman, Mrs. R. Janowitz, Mrs. David P. Johnson, Mrs. Harold Johnson, Mrs. K. A. Johnson, Mrs. Karl H. Kaye, Jr., Mrs. James S. MacFarlane, Mrs. J. Murray Marshall, Mrs. Ron McDonald, Mrs. Robert Metz, Mrs. Robert G. Mills, Mrs. Dean L. Morehead, Mrs. D. W. Mussen, Mrs. R. H. Nichols, Mrs. David G. Nielsen, Mrs. Edgar I. Pembleton, Mrs. V. T. Perberdy, Mrs. Donald Peters, Mrs. William F. Peters, Mrs. Robert Pirtle, Mrs. E. W. Pollock, Mrs. Arthur S. Reiswig, Mrs. Robert E. Reverman, Mrs. E. N. Simpson, Mrs. James Stremic, Mrs. James T. Stuntz, Mr. & Mrs. H. Myron Swarm, Mrs. Thomas J. Usher, Mrs. Ted Weld, Mrs. Russell E. Westberg, Mrs. H. E. Wheeler, Mrs. Mary Wood.

We are also grateful to the following members who have increased their dues to: *Sustaining* — Mrs. Willard J. Wrightman.

Terrace walk at Knightshayes Court, near Tiverton, Devon. Pair of *Cupressus arizonica* trees on right.

A "BUSMAN'S" HOLIDAY IN EUROPE*

BRIAN O. MULLIGAN

Part III — Devon and Cornwall

Leaving Ascot on May 24th we headed west on M3, a four-lane highway for a comparatively short distance, then on through Andover, across Salisbury Plain and portions of Dorset and Somerset counties into Devon, approximately 150 miles to Exeter, the chief city of the county. Here we met our host and hostess for the next three days, Colonel Eric and Lady Anne Palmer; later in the afternoon we followed Lady Palmer to their home at Torrington in north Devon, about an hour's drive from Exeter along the typically narrow and winding roads of this part of England. This was quite an education to one accustomed chiefly to broad straight highways!

Colonel and Lady Palmer's garden was obviously largely planted during the early years of this century, judging by the large specimens of incense cedar, Turkey oak and European fir to be seen, but it is now being modernized and greatly improved by the careful addition of good flowering small trees such as magnolias, Japanese cherries, mountain ashes and some firs and spruces. Many shrubs of good quality have also been added in recent years. Behind the house a steep hillside is well covered with native oak trees under which grow primroses, hart's tongue ferns (*Phyllitis scolopendrium*) and a native species of *Euphorbia.*

Next day we were very kindly driven by Lady Anne Palmer to Knightshayes Court near Tiverton to see this very well-known garden formed by the late Sir John Amory (deceased

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*Mr. Mulligan continues the account of his recent trip to outstanding arboreta and private gardens of England. All pictures were taken by him.

1972) and his widow, Lady Amory, still resident here although the garden is now a National Trust property. The house, built in the last century, is surrounded by parkland containing some superb old trees, especially oaks and beeches, which fortunately escaped being felled during the last world war. The walls of the Court are fully utilized either for the protection or support of many kinds of rare or tender shrubs or climbing plants including (on the south side) several kinds of roses, honeysuckles, *Ceanothus*, and the lavender blue *Solanum crispum* from Chile, then in full bloom. A terrace walk along this side leads into a delightful woodland garden, passing on the way a secluded small formal garden surrounded by tall yew hedges containing borders of grey foliaged plants and terminated by an ancient lead cistern filled with various plants at different seasons of the year. Under the oak trees in the woodland grow smaller trees or large shrubs: magnolias, eucryphias, the paperbark maple (*Acer griseum*), and the Chilean fire-bush (*Embothrium coccineum*), for example. Beneath these was an almost complete carpet of ground covers and taller herbaceous plants. One of the most unusual was *Ourisia coccinea*, from damp places in southern Chile; various species of *Euphorbia* were also very effective and decorative. Species of Himalayan *Meconopsis*, the blue (*M. grandis*) and the yellow-flowered (*M. regia*), were to be seen, as well as various kinds of ferns, primulas and hostas. Altogether this area formed an almost perfect example of this kind of woodland gardening. Space for weeds was reduced to a minimum.

Beyond we came into a more open area beneath tall Douglas firs, considerably developed in recent years, where a collection of *Rhododendron* species had been planted. *R. lindleyi* was in excellent condition here, as were young plants of the large-leaved *R. macabeanum* and *R. magnificum*, all indicators of a mild climate, as was the variegated form of *Pittosporum tenuifolium*, a New Zealand tree by no means hardy in Seattle.

A full description of this fascinating and beautiful garden will be found in the pages of the *R.H.S. JOURNAL,* Vol. 85, pp. 431-439 (Oct., 1960). Anyone visiting Devonshire should certainly take the time to see it.

Small enclosed garden at Knightshayes Court. Raised border in foreground for rock garden plants.

***Rhododendron crassum*, flowering at Caerhays Castle, Cornwall.**

From Torrington we continued south-west into Cornwall on a holiday week-end (Sunday, May 27). Traffic was heavy and mostly proceeding in the same direction as we were. Our destination for that afternoon was Caerhays Castle, situated on a peninsula jutting out into the English Channel, but considerably protected by tree plantings made in the early part of this century by Mr. J. C. Williams, founder of this unique garden. His place is now occupied by his grandson, Mr. F. Julian Williams, who was good enough to take us round that afternoon. This was the first time we had ever seen it in May, although I note that my first visit was made in April, 1935.

Most of the garden lies on the side of a hill which faces south and is largely covered by trees: conifers, especially Monterey pines to the west for shelter, oaks and an amazing number and variety of other deciduous and evergreen trees from western China and the eastern Himalaya throughout the remainder of the area. These were primarily derived from several expeditions by George Forrest between 1919 and 1932, for which Mr. J. C. Williams had been one of the major supporters. Because of the favorable climate some plants have survived here which otherwise would probably have been lost to cultivation: the evergreen *Michelia* species, for example, close relatives of magnolias; with certain evergreen oaks, hollies, and some maples. The collection therefore is of particular interest to staff members of arboreta and botanical gardens from comparable climates throughout the world.

Apart from these, however, Caerhays has become a Mecca for rhododendron lovers from such areas, including the Pacific Northwest, California and New Zealand. Here are to be seen vigorous specimens of many of the usually tender *Maddenii* series and its hybrids: *R. maddenii* itself, *RR. crassum, burmanicum, edgeworthii*, and the lovely and fragrant *lindleyi* with the hybrids 'Michael's Pride' (*R. dalhousiae* x *R. burmanicum*) and 'Saffron Queen' (*R. burmanicum* x *xanthostephanum*), both raised here. Another new race now flowering was *R. griffithianum* x *R. elliottii*, producing large flowers of rose- to blood-red hues. A pale lilac flowered hybrid between *R. ponticum* and *R. decorum* was also something of a novelty to us.

One of the great features of this garden is the collection of magnolias, many of them

***Rhododendron* 'Michael's Pride' (*R. dalhousiae* x *R. burmanicum*) in flower at Caerhays Castle, Cornwall.**

either raised from collected seeds from western China and its borders, or descended from such plants formerly growing here. But in late May we were much too late for any of these: *M. sargentiana* var. *robusta*, *M. sprengeri* 'Diva,' or *M. campbellii* subsp. *mollicomata*. We did, however, see and photograph the mahogany-red new foliage of *M. nitida*, an extremely handsome evergreen species introduced by Forrest from Yunnan, southwest China, in the 1920's. We paid similar attention to several flowering trees forty to fifty feet tall of the richly scented *Michelia doltsopa*, loaded with their white, magnolia-like flowers, another superb introduction from the eastern Himalaya but too tender for Seattle, although it can be grown around San Francisco. The suitability of the climate for magnolias can be judged by the size they have attained after fifty years growth: *M. cambellii* — sixty-two inches, and the hybrid M. × *veitchii* — one hundred and two inches in girth! The evergreen southern beeches (*Nothofagus*) are also very much at home here; we saw large specimens of *N. menziesii* and of *N. fusca*, the red beech, both from New Zealand, as well as of *N. procera*, one of the deciduous Chilean species which is growing satisfactorily in Seattle. An unusual and charming shrub flowering at this season was *Staphylea holocarpa* var. *rosea*; the pendulous racemes of small pink flowers appear before the leaves. This was one of E. H. Wilson's introductions from western China and is now established in the Arboretum in Seattle. So despite the dull and showery weather our visit to Caerhays again proved to be most rewarding; we are grateful to its most knowledgeable owner for his kindness and hospitality to us that day.

Two days later we were at another of the famous Cornish gardens, Trewithen, near Truro, owned by Mrs. G. H. Johnstone, who has continued to maintain and improve its notable collection of woody plants since Mr. Johnstone's death in 1960, more than half a century after he commenced planting there. Mr. Michael Taylor, the head gardener, took us round on another damp spring day which unfortunately precluded much photography. Nevertheless some exceptional specimens of both trees and shrubs were in flower, of which perhaps the most conspicuous was an *Em-*

Michelia doltsopa, forty to fifty feet high with glossy green, leathery leaves and multipetalled, richly scented white blossoms flowering at Caerhays Castle, Cornwall, England.

bothrium longifolium some thirty feet in height loaded with its scarlet blooms. The famous plant of *Rehderodendron macrocarpum*, of equal size, was still showing some flowers; this is a small Chinese tree of the *Styrax* family which has been most successful in Seattle, bearing very fragrant, white bells in April and large, walnut-like fruits in September-October.*

Trewithen is also famous for its magnolias, since the late Mr. Johnstone was the author of *ASIATIC MAGNOLIAS IN CULTIVATION*, published by the R. H. S. in 1955. The Lanarth form of *M. cambellii* subsp. *mollicomata* was very distinct from others in its broad, oblong, thick leaves; it is reported to come true to type from seeds. *M. wilsonii* and *M. sinensis* were both at their peak of bloom at this time, the latter represented by an exceptionally large-flowered form.

Other trees of great size and more than usual interest because of their rarity to us were the Winter's bark (*Drimys winteri*) from Chile and adjacent southern Argentina, a magnificent evergreen bearing umbels of creamy white flowers and having highly aromatic foliage when crushed. *Acer morrisonense*, a maple from the mountains of Taiwan, was producing quantities of small flowers on upright racemes, the tree being some thirty-five to forty feet in height. This species is fully hardy in Seattle and holds its leaves into December. Two species of *Eucryphia* (*E. cordifolia* from Chile and *E. moorei* from New South Wales, the latter over fifty feet tall and the largest known specimen in Britain) and of *Ilex* (*I. cyrtura* and *I. corallina*, both from south-west China) were most conspicuous even though not flowering.

Of shrubs we took particular note of several ericaceous plants: *Gaultheria forrestii*, both rare and ornamental with its racemes of white flowers; *Enkianthus chinensis*, the plants some fifteen feet high, loaded with their cream-white, red-tipped bells, much more decorative than those of *E. campanulatus; Vaccinium retusum*, from the Himalaya, and

Gaultheria forrestii in flower at Trewithen, Cornwall, England, Plant five feet high.

V. duclouxianum, the latter from south-west China and notable for the bronze coloration of its new foliage. But the pièce de résistance in this family was the row of plants of *Pieris formosa* var. *forrestii*, now more than half a century old, and twenty feet in height, raised from seeds originally collected by Forrest in Yunnan, China. The shrimp pink hues of their young shoots produced a remarkable effect on this gray and cloudy day, but in sunshine it would have been even more striking. Trewithen is indeed a wonderful place for anyone enjoying and appreciating unusual trees and shrubs, and I have only mentioned a tithe of what is to be seen there, not even the camellias, which are extremely well represented both as to species and hybrids, although we were too late for them. To Mrs. Johnstone and Miss Elizabeth Johnstone we must offer both our congratulations for their continued achievements in the garden, as well as our thanks for their great kindness to us that day.

We departed from Cornwall on May 30th, went over Dartmoor, around the city of Exeter,

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*Ed. note: See Arboretum Spotlight, p. 25 in this issue of the *BULLETIN*.

and reached our destination near Romsey in Hampshire, the home of Mr. and Mrs. Harold G. Hillier, owners of the world-famous tree and shrub nursery, unquestionably the largest anywhere of its kind. Here we stayed a night before continuing to London airport next morning, and were amused and pleased to meet Dr. T. Elias and Mr. D. Brown from the New York Botanical Garden, also travelling in Europe for horticultural reasons.

Hillier's Nursery is so enormous and his collection of plants so extensive that it would easily be possible to devote an entire article to it; however on this occasion I would only like to mention the area adjacent to their home. In front of it a large lawn has been chiefly converted to a display area for dwarf conifers, rock garden plants, and in a somewhat wetter section, to herbaceous plants. This allows customers to see well-established and properly labelled plants of many kinds in a small area, as well as providing material for propagation when needed by the nursery; it is an excellent plan from both points of view. To the rear of these irregularly shaped beds is a varied collection of young trees, part of the arboretum which Mr. Hillier has been building up during the past twenty years on this site. The major portion of it is to the west of the house and easily accessible to visitors. The plants are arranged in rows for ease of maintenance, and species and hybrids of one genus (e.g., *Acer* or *Sorbus*) grouped together for comparative purposes. Both of these genera are extremely well represented in the collection, as well as many others frequently or rarely cultivated in temperate climates. The catalogue published by the firm is in itself a thoroughly reliable work of reference on such woody plants.

Next afternoon we drove into the airport at Heathrow, deposited our rented car and departed via KLM for Rotterdam.

(to be concluded in the next issue)

Display borders at Hillier Nursery near Romsey, England. Dwarf conifers in rear border, moisture-loving plants in foreground.

Flowers of *Rehderodendron macrocarpum*; each ¾ inch long, 1 inch wide, white. From younger plant NW of Winter Garden in Arboretum. Photo: B. O. Mulligan.

Arboretum Spotlight

Rehderodendron macrocarpum

J. A. Witt

One bright light in the present topsy-turvy world situation is the détente now developing between the United States and the People's Republic of China. Aside from its political and social ramifications this renewed friendship may open that great country to new botanical exploration. There surely must be many more plants hiding in China that are equal to our spotlight subject, one of the last trees introduced before the Bamboo Curtain went up.

Rehderodendron macrocarpum was discovered in 1931 by a Chinese botanist in Szechuan and was introduced to western gardens a few years later. The Arboretum's original plant came from China in 1938 via the Arnold Arboretum and is now a tree about 20 feet tall growing near the Winter Garden.

In early May, when its leaves are about half developed it opens its lucid white bell-like flowers, each about an inch across with a cluster of yellow stamens hanging from the center. These are intensely fragrant and perfume the area for yards around.

After the flowers fade the tree retains considerable visual interest because of its reddish young shoots and dark green leaves marked with reddish midveins and petioles. In October there is another period of interest caused by the fruits, four-inch long woody structures also tinged with dull red.

We have propagated *R. macrocarpum* and distributed it to a number of botanical gardens and arboreta in the U.S. and Canada. A few seedlings have even appeared in the plant sales the past several years, so that we hope this rare and charming small tree may soon take its place with its relatives the *Styrax* in our gardens.

UNIT CONVERSATIONS

The Unit Council's Marguerite Sherman (Mrs. Dallas K.) who led the exciting Japanese Garden Tour last year is off again, conducting a Garden Tour of the British Isles. This tour presented by Doug Fox Travel Service is sponsored by the University of Washington Arboretum Foundation leaving Seattle on May 5th for Ireland, Scotland and England. The group will visit many of the lovely gardens of the British Isles ending with the International Flower Show at Chelsea. It promises to be an exciting trip visiting many historical sites along with the special bonus of many garden tours.

The November issue of *Sunset Magazine* featured the home of Nancy Hewitt (Mrs. David M.) who is on the Unit Council Board as Assistant Unit Program Planner. The article, "Every Single Room in the House Is a Garden Place" shows the Hewitt home which is designed for plants as well as people. Their lovely airy home accommodates plants in every room, including bathrooms, bedrooms and kitchen. Nancy was again featured in the February issue of *Sunset* showing how to grow "African Violets in a Strawberry Pot". She is a very dedicated Arboretum member and is sharing her knowledge and experience by giving talks on the care and raising of houseplants as well as propagating them for the Unit Council's Plant Sale on May 2nd and 3rd in the Arboretum.

This winter the Unit Council presented the Arboretum with a Truckster which will help during our current energy crisis. This three-wheeled vehicle, using less gas than a truck, will be used within the Arboretum grounds to help transport, men, plant material and remove trash.

Have you noticed the newly designed Experimental Bulb Garden just west of the Arboretum offices? This is planted and maintained by the Unit Council from unusual and colorful bulbs acquired through the Fall Bulb Sale. There are many species of *crocus*, tulips, *anemones*, *iris reticulata*, *nerine* (the Peruvian daffodill) several species of *allium*. Many more bulbs will be planted over the seasons.

Phyllis Morgan

SPECIAL COMMENDATIONS are in order for Arboretum Units 1 - the Juanita Graham Unit, Unit 26 - the Lillian McEwan Unit, and Unit 29 for their thoughtfulness with regard to *THE LONG ROAD TRAVELLED!*

At their recent meeting Unit 1 voted $135.00 to purchase fifteen copies of our book and presented them to the Seattle School District, one copy to be placed in each of the city's fifteen high schools. The books were accepted with great enthusiasm reported a member of the Unit. Three members of the same Unit purchased a copy to be placed in a Bellevue High School library.

Unit 26 presented a copy to the Bainbridge Island Public Library. Unit 29 purchased three copies to give to smaller libraries with limited budgets. One copy has been presented to the Green Lake Library, a branch of the Seattle Public Library and two copies have been given to King County Libraries, one to Lake Forest Park Library and one to Shoreline Library.

We think this is an excellent way of helping the general public know about the development and background of the College of Forest Resources and our Arboretum. It is also an effective promotion of our book. Let us anticipate that other Units will find different means of distributing *THE LONG ROAD TRAVELLED*. Promotion of it is every Foundation member's responsibility!

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Polystichum munitum (Sword fern)

*Elizabeth Martorano**

It would be unimaginable for me to garden without the use of the versatile Sword fern (*Polystichum munitum*). It has proven to be a hard worker and a real beauty.

An ubiquitous northwest native, it is easy to transplant (but usually overlooked). It is best dug in fall or early spring before the new fronds unfold. One must be sure to get the roots and not just the crown. It can also be moved around the garden with ease. A few tucked around the base of your rhododendrons will keep the roots moist and cool; they can be used to soften the harsh or abrupt feeling of plant material in the garden, or to give a finished look. Perhaps there's something that needs to be hidden or an area that needs filling in quickly. Maybe your garden has a shady spot where it is difficult to grow any plants; sword ferns will probably do very well; however, don't think that is all they are good for. They are beautiful, useful plants that should be used much more in our northwest gardens.

No matter if yours is a small city garden or a large woodland, sword ferns have a place in it. They can be planted singly, in containers, or used in a mass. They are great in a large rockery and make beautiful bank covers. A non-invasive ground cover, they are delightful companions for bulbs, perennials and deciduous shrubs.

Bold in design, the sword fern is THE great landscaping fern. Its graceful, arching, evergreen fronds, two to four feet long, hold hands in my garden and tie the grounds together. This is especially noticeable in the winter when all the herbaceous plants have disappeared. They are long-lived too.

Each spring, silvery fiddleheads uncurl into a light green frond turning a deep waxy green by summer. Tidy gardeners remove the old fronds after the new ones have unfolded. I do only if it really looks bad or if I feel very ambitious. Sometimes I just roll up the brown fronds and tuck them in close to the crown. Actually Mother Nature planned for them to decompose and enrich the soil.

A sword fern's requirements are few: friable soil, preferably woodsy (leaf mold), and adequate moisture. Once established, about a year, it can withstand our natural summer drought. These ferns will grow in full sun but prefer some shade. However easy to grow, they do respond to care. A little leaf mold around the crown (please watch and don't bury it!), some glances of concern, lots of appreciation and one will be highly rewarded for little effort.

*Elizabeth Martorano (Mrs. August), a member of the Myrtle DeFriel Unit Number 16, has been in charge of the Fern table at the Plant Sale for several years.

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Supporting Organizations
(continued from p. 9)

the time of the annual plant sale. Years ago, the original members who worked there were educated in the science and techniques of plant propagation by members of the staff. Now, our members are responsible for carrying on that very fine educational program. The greenhouse is used five full day sessions a month by five different crews of eight members. Units can arrange for propagation sessions with an experienced advisor assisting at other times. This is a self-supporting program. All the expenses for the operation of the greenhouse are more than covered by the sale of plant material with any balance in funds going to the Arboretum. The design of the structure makes demonstrations and lectures easy to handle, because the work space is separated from the greenhouse area. And we are pleased that the staff is using it for adult education courses sponsored by the University. Members of the staff are always alert for any maintenance problem we might encounter, and we are grateful and appreciative of that.

The single biggest money raising project within the framework of the Foundation is the Annual Plant Sale which is directed by the Unit Council and assisted by members of the Foundation who are not active in unit work. Plans for future sales start with balancing of books on the last one. It is a cooperative venture involving up to four hundred workers and for the one and a half days of selling plus the day or more of set-up, it provides an unforgettable experience for both worker and buyer.

I think I have been remiss in not mentioning previously that we have many men in our organization and their participation with all of the program is very strong. In units, as members of the Board, and as officers, they have shared the work, pleasures and rewards of the activities at the Arboretum and are marvelous and indispensable help at the sale.

I have purposely mentioned service outlets for volunteer participation in the educational field and hours spent in assisting the staff in its important role. This type of assistance is quite different from that given to money raising activities. But it seems to me more important in developing knowledgeable appreciation of what a botanic garden or arboretum can mean to the individual as well as to a community.

I have made no mention of contributions in dollar figures, and I have no plan to do so. One community varies from another in so many ways that the accomplishments of supporting groups will vary accordingly.

The future surely holds great challenges in education, research and public service. New ways will be found to plan meaningful demonstrations of plant material. New subjects can be added to lecture series on topics such as local ecology, land management, soil problems and plant diseases. And there can be greater use of the television media to reach outlying areas. Certainly supporting groups will be able to make an extremely important contribution in this area in volunteer service and financial backing.

If I were able to make one lasting, thoughtful contribution to this important gathering it would be my personal reflections on how to face the future in our efforts of support. By this time, the value of supporting agencies is generally acknowledged. In our own case, it is perfectly fair to say that without outside help the Arboretum could not possibly be where it is today. But since the intrinsic value of the Arboretum has become recognized by our legislature and the community, our University is now able and hopeful of developing it to its potential. And it is the proper time for us to accept the maturity of this development. We are a supporting organization. We are not the directing and operating force. Over the long pull there has been very fine rapport with the officers and staff of the University. The only times of exception have been occasions when the supporting groups felt they were in a position to dictate policy. This cannot work and should not be attempted. Basic to any assisting group's thinking should be their understanding of their relationship with the directors of the institution. I feel sure that with that basic, mutual understanding our assistance will not only be gratefully and willingly received but actively sought. ▲

Crab Apples *(continued from p. 15)*

'Lemoinei,' probably superior to 'Profusion' in redness of blossoms, is susceptible to scab and slow to form flower buds; I had hoped to hasten flower bud formation by graftage to dwarfing rootstocks; thus far, graftage results have been poor.

Other notable crab apples not yet fully evaluated include the Tea Crab (*M. hupehensis*), rated (R) in Wisconsin; 'American Beauty' (Pl. Pat. 2821), a double dark red; 'Fuji,' a double white; 'Pink Cascade'; 'Snow Cloud' (Pl. Pat. 2913), a double white; 'Snow Drift'; 'Spring Snow' (Pl. Pat. 2667); 'Royal Ruby' (Pl. Pat. 3052).

CRAB APPLE RESEARCH NEEDS

The need for systematic study of scab resistance in the Puget Sound environment has been mentioned. It is known that the scab fungus itself is variable. Some strains may be more infectious than others and may infect different crab apple varieties. Research on the strains of the fungus that occur here would be helpful.

Dwarfing of crab apples needs research to learn why some varieties do not join readily with tree-size-controlling rootstocks.

Those varieties and species of crab apple that can be grown on these rootstocks should be planted in a joint research-demonstration project of long duration to show the relative sizes of young and mature trees grown on different rootstocks, and their ornamental values.

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Book Reviews

THE INTERNATIONAL BOOK OF TREES, by Hugh Johnson. Simon & Schuster, New York, 1973. 288 p. $29.95

The dust jacket of this spectacular volume rightly claims that "the first fully illustrated book to include all the major garden and forest trees of the temperate world, from America to Asia, The International Book of Trees is an unforgettable journey through this magnificent and intricate world of natural beauty". Included are many pages of background material on such topics as tree growth, the tree's place in history, the art of bonsai and the use of trees in landscape design; then a major section containing the description of more than six hundred tree species illustrated by close to a thousand color photographs; and finally a useful compendium of charts, tables, and indexes on everything from flowering time to the meaning of botanical terms.

Combining a keen eye with a vivid imagination, Johnson brings the epicure's prospect, so evident in his recent book on wines, to a fare normally accepted as dull staple in the diet of dendrologists. "The view up the side of a (true) fir tree is of thousands of little aircraft zooming out from the centre: shoots and side-shoots create a design of crystalline energy and rigour against the sky. A juicy rigidity is equally well expressed in the needles: plump leathery and firm, apparently adhering to the stout shoots with little round sucker pads". Or, on *Pseudotsuga menziesii* "The 'pseudo', with the implication of moral turpitude, I (on it's behalf) most categorically refute. It was never a hemlock, and it never pretended to be".

Clearly, this splendidly outfitted book ranks high on the appeal index and will top the list of nature lovers' gift suggestion in the thirty-dollar bracket. The quality of the photography alone may compell the browser to buy this *opus pulcherrimus*. Couple this with the author's engaging commentary and the attraction approaches the irresistible. It is a winning formula that has successfully furnished the living rooms of our affluent society with similarly luxurious conversation pieces on classic cars and great religions.

As long as such book efforts are confined to the descriptive, impressionistic realm, they can do little harm. In fact, they may alert the reader to new vistas and sharpen his observational powers. However, if such books transgress into the explanatory domain we often find their glib half-truths to overshadow their visual flourish. To those of us who spend a good deal of our time trying to unravel a few secrets in the biology of trees, and who spend the rest of our time trying to convey to students the direction in which to strive for an understanding of nature, the Hugh-Johnson approach to trees is what a plastic chair must be to a restorer of antique furniture.

It reflects, for example, a lack of insight into the adaptive geometry of trees to suggest that "leaf shape in itself. . . . can't be very important: so many variants arise from tree to tree . . ." and to substantiate this claim by referring to the many "cut"-leaf varieties among hardwoods or to the many eccentric varieties among conifers which supposedly "make no difference to the tree's functioning" (p. 12). If such mutant leaf shapes were indeed adaptively neutral, why do we find them primarily among nursery stock but rarely in natural populations? Clearly, leaf shape varies within a species, often within a tree, but this variation is genetically controlled to be expressed within certain limits. And most mutations transgressing these limits typically disrupt the physiological harmony of the plant, in fact often causing its death. Or anybody familiar with the intricate chemical changes taking place during the development of a fruit; some having to do with seed nutrition, some with seed protection against predators, some with inhibiting premature germination, and others with creating an optimal milleu for early seedling growth, to name a few; will be insulted by the simplistic formula (p. 16): "Fruit always has one simple purpose: to put as much distance as possible between itself and its parent tree". Such shorthand not only distorts the facts but also deprives the layman from gaining a broader perspective over the complex but intriguing patterns of adaptive strategies in tree reproduction. As to be expected in a book of this type, anthropomorphisms dominate the scene. For example, on tree growth we read on page 11: "As it grows it gradually shades out and kills its own lower branches"; or on page 22: "All the seed knows is that the ground is downwards".

Should we worry about the inevitable minor errors and techincal slips in such a volume? I don't think so. Nor do I feel that such publications may not serve some useful purpose. After all, television is here to stay, too, and from time to time we even exploit it for some meaningful experience. And as a weary televiewer eventually may develop enough motivation to go see a play, so one or the other of Hugh Johnson's readers may get struck by the spark to go outside to *really* look at a tree, with open eyes and an open mind. May his curiosity be rewarded.

R. F. STETTLER
Professor, College of Forest Resources
University of Washington

THE BOOK OF FLOWERS, by Alice M. Coats. McGraw-Hill Book Company, New York, St. Louis, San Francisco. $30.00.

The subtitle of this book 'Four Centuries of Flower Illustration' is misleading because it definitely is the main theme of Ms. Coats volume, while information relative to flowers as living plants is at a minimum in her text.

In compiling this representative collection of four hundred years of flower illustrations the author has done a magnificent job.

The fourteen page introduction provides an excellent background for different eras of illustration beginning with the herbals of the fifteenth and sixteenth centuries. The illustrations of herbals in most cases were monotonous, but in several instances were exceedingly well done.

Florilegiums were recognized by the artists of the seventeenth century and were designed for and drawn by those who appreciated flowers for their beauty. In this same period the 'florist' and his perfected flowers was evident.

The eighteenth century produced superior botanical artists. George Dionysius Ehret has been judged by some to be the finest botanical artist of all time. Ms. Coats imparts sufficient information about the various artists to enable you to have a basic understanding and knowledge of most of them.

The eighteenth and nineteenth centuries produced illustrators of a great many floras including exquisite specimens of exotics. The demand for drawings of foreign plants seemed insatiable and led to many native artists in foreign countries learning to make plant drawings for the European market. The nineteenth century saw the peak of botanical illustrations. New medias and processes were used, including lithography. The 'lady flower painters' became more prominent at this period and published some impressive works.

Alice Coats feels that another renaissance of flower drawing is visibly in progress, but the very perfection of modern reproductions minimizes the personal touch which makes hand colored engraving or lithograph a work of art.

In my opinion no modern painter has approached the incredible techniques and colorations of the 'Old Masters' in most forms of art, including flower illustrations. I have never received a satisfactory explanation from an artist about this subject. Maybe it is the dedication and time devoted to a single canvas or drawing by the artists of the past that achieves this masterful effect.

Following Ms. Coats introduction 176 pages of the book are devoted to 126 plates (many in color) with notes on each. The drawings are variable and unique enough so you know there is an interesting background for each of them. Indeed one of the last ones had an informative note for our Pacific Northwest readers. It was a beautiful hand colored engraving of *Ribes sanguineum.* The Horticultural Society considered that the introduction of this shrub alone, by David Douglas in 1826, was worth the whole cost (some £400) of the three year expedition.

As a closing note this book forms an excellent reference for anyone interested in developing plant illustrations. Many of the shading techniques used

by these artists of the past are beautiful and effective.

The author's notes are very informative and interesting and I think you might well start browsing in order to enjoy the beautiful pictures and end up reading every word.

MAREEN S. KRUCKEBERG
Rare and Native Plants Nursery Operator

Ed. note: The validity of a review is dependent upon its author. Regretfully, B. J. D. Meeuse's name was inadvertently omitted in the last issue of the BULLETIN, Winter, 1974, p. 26. Dr. Meeuse, Professor of Botany, University of Washington, authored the review of Tompkins and Birds *THE SECRET LIFE OF PLANTS.*

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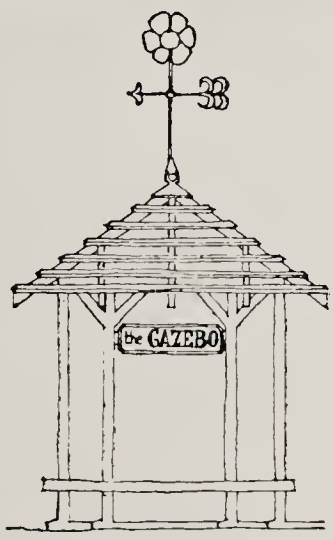

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